



## **Environmental Management Transfer and Environmental Performance by Japanese Firms in Thailand**

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### **Abstract**

This paper analyzes the determinants of environmental management transfer and environmental performance by Japanese firms in Thailand. For sustainable development, all actors need to contribute to the reduction of environmental loads. This requirement is part of a corporate social responsibility. Data obtained from a questionnaire survey on Japanese subsidiaries in Thailand are used in the analysis. Government regulation, environmental strategy, organization and environmental performance are the key factors in the analytical framework. This paper uses ordinary least square (OLS) method for estimation. The results of the analysis indicate that the environmental management system and green procurement by parent firms are significantly related to the international transfer of these practices. Top leadership and the goal of environmental management in the subsidiary are also significantly related to the transfer. The emphasis of environmental strategy leads to improved environmental performance. Specifically, water and air performance are related to top initiative. In contrast, CO<sub>2</sub> and waste performance are related to the priority of environmental management. This paper presents new findings in environmental management.

**Keywords:** Environmental management; Transfer; Determinant; Environmental performance; Thailand; Japanese firm

### **Introduction**

Firms are substantially supported by various kinds of stakeholders, such as investors, consumers, customers, employees, government,

communities and NPOs (Non-Profit Organizations), and firms need to meet stakeholder requirements. Since the 1990s, the triple bottom line [1], Global Compact and ISO26000 indi-

cate that firms must achieve social responsibility of economic, social and environmental dimensions. In particular, environmental requirements have become important for the sustainability of Earth. Since the last decade of the twentieth century, many countries have introduced environmental laws and regulations. In EU, the Restriction of Hazardous Chemicals (RoHS) directive prohibits firms from using certain toxic chemicals in the electric and electronic products.

Thus, firms have to perceive environmental measures as a social responsibility. To respond to social demand, they have started to address environmental measures in various ways. Environmental issues are diverse and complex so that no one means can completely solve the issues. Each activity at each stage of the total process, raw materials, logistics, manufacturing, sales, waste and recycling, impact the natural environment. In this sense, actions in the whole supply chain as well as the manufacturing process within an organization are needed to improve eco-efficiency in domestic and overseas operations. Corporate Value Chain (SCOPE3) Accounting and Reporting Standard, which was published in 2011, asks businesses to estimate greenhouse gas emission in their supply chain, and to make efforts to reduce emission. To manage supply chain for reducing environmental burden, firms operate globally need to transfer technologies and procedures to overseas operations.

We conducted survey research in Thailand to examine the determinants of international transfer of environmental management practices in Japanese subsidiaries. Thailand is in the early group of ASEAN industrialization. Thai per capita income was 5,678 USD in 2012, and the country received a huge amount of investment by Japanese firms after the 1985 G5 Plaza Accord. There is now a large automobile industrial cluster. The business experience of subsidiaries in our sample is, on average,

approximately 20 years. In this sense, subsidiary firms in Thailand built the business so that a subsidiary's environmental practices are at the recognizable level. In this paper, we analyze environmental management by Japanese subsidiaries in Thailand and the factors that enhance the transfer of environmental management and its performance.

### **Literature review**

The question is why a firm transfers its environmental management practices to overseas operations. The overseas operations of multinational enterprises (MNEs) are a premise of this transfer. In principle, corporate environmental management is carried out in the broader framework of corporate management as part of business activity. Therefore, investment decisions are made under the management decisions of a firm. The question posed can be answered from the perspective of why firms operate globally. Internalization theory, transplant management and resource-based view provide a useful basis for our analysis.

First, a number of theories have been developed to explain why firms make foreign direct investment (FDI). Among theories, the internalization theory by Buckley and Casson [2] and the eclectic theory by Dunning [3] are widely discussed in the relevant studies. These theories explain why firms make investment, by focusing on competitive advantage.

Second, transplant management was investigated. When US corporations increased FDI in the 1960s, Koontz [4] argued the universal validity of the US management method and principles. The management system and production system of Japanese firms also attracted much attention in the 1980s since there was a large trade imbalance between Japan and the US. In the increasing competitiveness of Japanese industry, yen appreciation after 1985 and trade negotiations with the US to reduce the trade imbalance strongly pushed Japanese firms into

transferring their plants to the US and ASEAN. In these studies, arguments tend to stress the uniqueness of Japanese management and its limitations of application. However, empirical case research indicates that there are many Japanese firms operating globally and achieving good performance such as the automobile industry's New United Motor Manufacturing, Inc. (NUMMI) in Fremont, California. NUMMI has been pointed out as successful case of transplant [5].

In the 1980s and 1990s, the Japanese production system and its overseas transfer attracted the attention of researchers and management. The production system with high productivity and close assembler-supplier relationships was analyzed in the automobile and electric industries. Florida and Kenny [6] indicated that the US transplant of Japanese multinational firms transfer and adopt similar environmental practices as in Japan.

Third, the resource-based view argues that resources and organizational capabilities are the basis of growth and performance ([7,8]). This view suggests that FDI is an effective means to transfer resources and organizational capabilities to overseas operations so that the transfer generates competitive advantages. Firms obtain sustainable competitive advantage when FDI is complemented by organizational capabilities [9]. Here, organizational capabilities are defined as the ability that creates a new product, technology, service or business system by integrating organizational activities and resources. Subsidiary operations can swiftly obtain the necessary capabilities by the transfer of practices from parent firms to handle environmental issues. Consequently, it is effective to save input resources and to decrease environmental risk. The transfer of environmental management to developing countries will contribute to first mover advantage on the

one hand and competitive advantage of the subsidiary or local suppliers on the other [10].

Here, we define environmental capability as the organizational, technological and institutional ability to reduce environmental burden. Environmental capability implies the ability to reduce environmental impact at the level of process, product, organization and institution. As environmental issues have various aspects, the transfer of environmental management to overseas operations is implemented in a variety of ways using a variety of practices. Firms transfer numerous practices such as equipment, technology, know-how, policies, procedures, the ISO14001 system, green purchasing guidelines, environmental reports, life cycle assessment (LCA) and environmental accounting. These practices are broadly classified into administrative activity such as ISO14001, green purchasing and environmental accounting, and technological activity such as waste water treatment, eco-design and recycling.

With relation to organizational capabilities, knowledge transfer is analyzed in the study of multinational enterprises [11, 12, 13, 14]. This knowledge transfer is closely related to the organizational capability of the foreign subsidiary, where organizational capability is defined as organizational routine [15]. In this sense, the transfer of organizational capability is the transfer of organizational routine and is to learn new organizational routines such as ISO14001, green purchasing and recycling. When the learning of new organizational routine implies the building of new organizational capability, the learning of new organizational routine transfers new knowledge to subsidiary firms. Consequently, the learning of a new organizational routine implies new organizational capability [16]. Organizational capability then has positive impact in increasing competitiveness.

## Methodology

### 1) Data

For analyzing the transfer of environmental management practices, we conducted a questionnaire survey of Japanese manufacturing subsidiaries in Thailand. Questionnaires were delivered by post to Japanese manufacturing subsidiaries in August 2010. To make a mailing list, we used the Company Directory from Toyo Keizai Shiposha [17]. This is the largest directory of Japanese overseas operations. Of the 460 questionnaires delivered, 51 effective responses were obtained. Respondents were the Japanese managing directors or managers of the subsidiary.

The samples were classified in terms of the number of employees. Small firms, which had 1-299 employees, accounted for 8 firms (15.7%), medium firms, which had 300-999 employees, accounted for 29 firms (56.9%), and large firms, which had more than 999 employees, accounted for 14 firms (23.5%). As to industrial classification, we could not classify the samples at the 2 digit level. We classified samples into three groups to confirm the general characteristics of the industry: raw material, assembly and living-related. Each group accounted for 10 (19.6%), 29 (56.9%) and 12 (23.5%), respectively.

FDI from Japan to Thailand was 10.03 million Baht in 2010. This accounts for 35.9% of all FDI to Thailand followed by the EU (26.7%) and Singapore (6.9%). In 2013, investment from Japan to Thailand jumped to 63.5%, followed by the EU (6.1%) and Singapore (3.5%) [18]. Thus, Japan accounts for the largest investment in Thailand. FDI transfers various resources such as capital, technology, machines, equipment, systems and human resources. With this FDI, we assume that various types of environmental management practices will shift to subsidiaries.

We define multinational enterprise as a firm that operates in more than two countries [2]. This definition, therefore, does not necessarily mean a large firm. It sometimes includes smaller firms with less than 300 employees in the food, garment and stationary Industries. Our focus is the Japanese subsidiary in Thailand operating in the manufacturing sector. For these firms, we examine the transfer of environmental practices from parent to subsidiary.

### 2) Analytical framework

Although studies in the international transfer of environmental management are limited, previous studies of FDI and multinational management provide a useful basis for our analysis. We developed an analytical framework that consists of external factors, strategy, organization and environmental performance. This framework was developed from preceding studies in management. Market, strategy, organization and performance are the main dimensions in the study of strategic management and organization theory [19]. Viewing theories of management transfer under FDI, three factors are important as a determinant for the international transfer of environmental management practices. These are government, customer/market and internal resources/strategy of the firm [10]. These factors are profoundly related to internalization theory and resource-based view. There is previous research on the influence of these three factors, but quantitative evidence for these factors is limited. The effect of each factor, the interaction between the factors and the transfer process remain to be examined.

Therefore, we intend to analyze the determinants of environmental management transfer and environmental performance of overseas subsidiaries quantitatively using the data from Japanese subsidiaries in Thailand. This framework focuses on the effect of external factors, practices of parent firms and environmental

strategy of the subsidiary in the transfer and environmental performance of subsidiaries.

### 3) Variables

First, in this framework, we adopted three variables of external factors: government regulation (GOV), demand by local community (COM) and customer and market demand (CUS). Government is a key stakeholder that enacts regulation for corporate activities [20]. Government regulation (GOV) measures the degree to which government environmental policy and regulation are strict. Community pressure (COM) is the degree to which the local community requests strict environmental standards. Customer and market pressure (CUS) is the degree to which customer request is strict. Regulations, such as RoHS, for controlling chemical substances urge firms to implement green procurement in the whole supply chain process. Such environmental regulations are also reflected in market and customer demand.

Second, preceding studies often point out that strategy is one of the main factors that determine the transfer of management practices [10]. Strategy means guidelines that direct the decision-making and integrate various resources and activities. It is a framework to integrate behavior in the organization and helps motivate members and clearly states the goal. When the strategy is clear on what to achieve and how to implement the strategy for the organization, it contributes to motivating members of the organization. As a strategic variable of subsidiary firms we adopt top leadership (LDS) and environmental goal (GOAL) of the subsidiary firm. Top leadership for environmental management means the degree to which the top leadership plays an important role in environmental issues. The goal of environmental achievement indicates the degree to which the subsidiary aims to achieve for the environment.

Third organizational factors can be classified

into either administrative practices or technological practices. We use the two practices as an indicator: environmental management system and green procurement. Green procurement by parent firms (PGREN) means the degree to which parent firms implement green purchasing. The acquisition of the ISO14001 certificate (ISO) and environmental report (REP) are combined to obtain the environmental management system (MANA). For parent firms, PISO and PREP are combined into PMANA. Ownership ratio (JOWN) measures the degree of ownership control.

Fourth, four indicators are used for environmental performance: water pollution (WPER), air pollution (APER), CO<sub>2</sub> (CO<sub>2</sub>PER) and waste (WSTPER). The environmental performance indicator is typically greenhouse gas (GHG), chemical substances, solid waste, and CO<sub>2</sub>/energy [21]. However, there is difficulty not only integrating different indicators but also obtaining objective data. In this paper, a Likert type scale is used to measure environmental performance.

From the descriptive data in Table 1, we recognize that the ownership ratio by Japanese parent firms is, on average, 87.3%. This implies that the ratio is sufficient for the parent firm to maintain control of the subsidiary. Then, for external factor, CUS (3.569) shows higher score than GOV (3.039). This implies that the customer is perceived as more influential in the environmental management of the subsidiary than the government. Subsidiary firms feel greater pressure from the customer than the government.

In Table 2, the correlation between LDS and GOAL is high ( $r=0.531$ ,  $p<0.05$ ). Because of the high correlation, we use LDS and GOAL separately in Model 1 and Model 2. The relationship between PGREN and GREN is not significant. PMANA and MANA are significantly correlated. We discuss this point in the the next section in relation to the results of Model 1 and Model 2.

**Table 1** Descriptive statistics

Variable			Mean	SD
External factor	GOV	Government environmental regulations and mandates are strict	3.039	(0.916)
	COM	Community demand for environmental performance in Thailand is strong	3.220	(1.075)
	CUS	Customer demand for environmental performance in Thailand is strong	3.569	(1.063)
Organization of parent firm	PISO	Your parent company has obtained ISO14001 certification	2.076	(0.701)
	PREP	Your parent company has an environmental or sustainability report	2.625	(0.733)
	PGREN	Your parent company is implementing green procurement	3.000	(1.616)
	JOWN	The ownership ratio of Japanese parent firms	87.319	(16.837)
Environmental strategy	LDS	Leadership on environmental issues by top management is strong	4.216	(0.856)
	GOAL	Your company has specific goals for reducing environmental burdens	4.118	(1.306)
Management system	ISO	Your company has obtained ISO14001 certification	2.627	(0.747)
	REP	Your company emission data is reflected to parent company's environmental report	2.260	(0.876)
	GREN	The green procurement level of your company is equal to those of companies in Japan	3.458	(1.148)
Environmental performance	WPER	The level of waste water treatment in your company is good	4.140	(1.050)
	APER	The level of air emissions reduction in your company is good	3.896	(0.881)
	WSRPER	The level of solid waste emissions reduction in your company is good	3.980	(0.869)
	CO2PER	The level of CO2 emissions reduction in your company is good	3.894	(0.914)

Note: The items are measured in a Likert type 5 point scale, except for ISO and REP, which are measured at 3 points.

**Table 2** Correlation among variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 GOV	1.00													
2 COM	0.28	1.00												
3 CUS	0.22	0.52**	1.00											
4 PMANA	-0.05	-0.11	-0.11	1.00										
5 PGREN	-0.14	0.15	0.01	0.44**	1.00									
6 JOWN	-0.12	-0.15	-0.12	-0.21	-0.06	1.00								
7 LDS	0.04	0.13	0.06	0.30*	0.32*	-0.35*	1.00							
8 GOAL	0.05	0.21	0.33*	0.54**	0.41**	-0.36**	0.53**	1.00						
9 MANA	-0.06	0.16	0.37**	0.42**	0.37**	-0.26	0.35*	0.67**	1.00					
10 GREN	-0.16	0.01	0.05	0.02	0.23	0.25	-0.16	-0.01	0.03	1.00				
11 WPER	-0.05	0.04	0.00	0.19	0.22	-0.11	0.37**	0.20	0.11	-0.01	1.00			
12 APER	0.11	0.11	-0.05	0.04	0.16	-0.14	0.45**	0.27	0.10	0.33*	0.42**	1.00		
13 WSTPER	-0.15	-0.02	-0.05	0.33*	0.42**	-0.39**	0.44**	0.54**	0.40**	0.16	0.30*	0.48**	1.00	
14 CO2PER	-0.18	0.04	-0.01	0.26	0.24	-0.30*	0.38**	0.43**	0.34**	0.14	0.31*	0.69**	0.58**	1.00

Note: ISO and REP are combined and summed up as MANA, and PISO and PREP are combined and summed up as PMANA.

\*\*p < 0.01, \* p < 0.05

## Results of analysis

### 1) Transfer of practices

Our objective of analysis is to reveal the determinants and process of the transfer of environmental management to overseas subsidiaries. The model uses MANA and GREN as the dependent variables. External factors (GOV, COM and CUS), organizational factor of the parent firm (PMANA, PGREN and JOWN), strategy (LDS or GOAL) of the subsidiary as independent variables are as shown in Model 1 and Model 2. The ordinary least squares (OLS)

method was used for estimation. As the correlation between LDS and GOAL was high ( $r=0.531$ ,  $p<0.01$ ), we estimated by separately using LDS or GOAL. The dummy variable indicates 0 when the number of employees is less than 299 and 1 when the number of employees is greater than 300 according to company size categories in the official statistics of Japan.

The results of the analysis shown in Table 3 indicate that PMANA is significantly positive with environmental manage system (MANA) of the dependent variable. Top leadership (LDS)

as an indicator of strategy, however, was not significant with environmental management system (MANA). On the contrary, GOAL is significantly positive with MANA, which implies the transfer of environmental management to the subsidiary.

Model 1:

$$MANA = \beta_{m1}GOV + \beta_{m2}COM + \beta_{m3}CUS + \beta_{m4}LDS \text{ (or GOAL)} + \beta_{m5}JOWN + \beta_{m6}PMANA + \beta_{m7}Dummy \tag{1}$$

Model 2:

$$GREN = \beta_{g1}GOV + \beta_{g2}COM + \beta_{g3}CUS + \beta_{g4}LDS \text{ (or GOAL)} + \beta_{g5}JOWN + \beta_{g6}PGREN + \beta_{g7}Dummy \tag{2}$$

**Table 3** Results (MANA, GREN)

	Model 1 (MANA)				Model 2 (GREN)				
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	
GOV	-0.147	-1.179	-0.098	-0.839	GOV	-0.151	-0.944	-0.163	-0.999
COM	-0.055	-0.373	-0.083	-0.606	COM	0.049	0.266	0.035	0.186
CUS	0.466	3.172**	0.302	2.079*	CUS	0.102	0.572	0.168	0.858
PMANA	0.365	2.908**	0.159	1.128	PMANA	0.301	1.897	0.308	1.734
JOWN	-0.102	-0.806	-0.065	-0.558	JOWN	0.187	1.159	0.221	1.374
LDS	0.194	1.515			LDS	-0.208	-1.239		
GOAL			0.465	2.969**	GOAL			-0.155	-0.759
D-scale	0.169	1.360	0.124	1.062	D-scale	-0.010	-0.068	-0.006	-0.036
Constant	1.825	0.249	1.470	1.004	Constant	1.773	1.631	1.489	1.289
Adj R <sup>2</sup>		0.348		0.481	Adj R <sup>2</sup>		0.030		0.007
F value		5.241**		6.968**	F value		1.204		1.044
DW		2.349		2.365	DW		1.556		1.616

Note: \*\*p < 0.01, \* p < 0.05

In Model 1, CUS has significantly positive relation with MANA in both LDS and GOAL as a strategy indicator. PMANA is not significant with MANA in Model 1 with GOAL. On the other hand, green procurement (GREN) is positively related to the green procurement of the parent firm. Even though it is positive, both PGREN and CUS are not significant to GREN for the subsidiary. The F value was relatively small.

From these results, we conclude that the environmental practices of an overseas subsidiary are closely related to the parent firm practices. The results indicate that when a parent firm is committed to environmental management, this commitment tends to be transferred to the foreign subsidiary. When the parent firm implements an environmental

management system, the commitment is likely to be transferred to the overseas operation. However, the relationship between PGREN and GREN is not significant.

**2) Environmental performance analysis**

Next, we examine the determinants of environmental performance of a subsidiary in Thailand. The dependent variables are water performance (WPER), air performance (APER), CO2 performance (CO2PER) and waste performance (WSTPER). The independent variables are same as in Model 2. The models are developed as (3), (4), (5) and (6) below. As LDS and GOAL of the strategic factor were highly correlated to each other, estimation was done separately as mentioned above. The dummy variable was same as in Model 1.

The results in Table 4 indicate that top leadership is significantly positive with water performance (WPER) and air performance (APER). These results suggest that top management compliance consciousness and initiative positively influence environmental performance. F value, however, is not significant in Model 3 and Model 4. In Table 4, it is shown that the model using GOAL as an independent variable is not significant in terms of F value and coefficient.

The results in Table 5 indicate that environmental goal (GOAL) is significantly positive with waste (WSTPER) and CO<sub>2</sub> (CO<sub>2</sub>PER). In general, regulation for solid waste and CO<sub>2</sub> emission are not practiced, and the responsibility requires discretionary commitment by organizations to contribute to sustainable development. Therefore, goal and commitment under

the management initiative are essential. Differing from WPER and APER, which depend on end-of-pipe technology or cleaner production, CO<sub>2</sub>PER and WSTPER depend more on administrative measures.

From these data, we recognize the strategic factors that influence the environmental performance of water and air under the explicit emission criteria are compliance consciousness and top management behavior. Alternatively, as to CO<sub>2</sub> emission and solid waste, voluntary goal setting and commitment towards this goal influence environmental performance. LDS is significantly related to WSTPER, but not significant with CO<sub>2</sub> (CO<sub>2</sub>PER). These results show that GOAL plays a more important role than LDS in the performance of waste and CO<sub>2</sub> emission.

**Table 4** Results (WPER, APER)

	Model 3 (WPER)				Model 4 (APER)				
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	
GOV	-0.056	-0.376	-0.046	-0.290	GOV	0.100	0.690	0.111	0.715
COM	0.008	0.044	0.043	0.237	COM	0.109	0.646	0.116	0.642
CUS	0.016	0.092	-0.071	-0.383	CUS	-0.146	-0.857	-0.228	-1.247
JOWN	0.022	0.141	-0.049	-0.303	JOWN	0.011	0.072	-0.039	-0.243
LDS	0.393	2.553*			LDS	0.451	3.039**		
GOAL			0.223	1.283	GOAL			0.329	1.866
D-scale	-0.078	-0.529	-0.101	-0.633	D-scale	-0.055	-0.386	-0.139	-0.870
Constant	1.590	1.446	1.402	2.988	Constant	1.279	1.447	1.145	3.012**
Adj R <sup>2</sup>		0.031		-	Adj R <sup>2</sup>		0.123		0.007
F value		1.256		0.427	F value		2.079		1.058
DW		1.802		1.777	DW		2.100		1.863

Note: \*\*p < 0.01, \* p < 0.05

**Table 5** Results (WSTPER, CO<sub>2</sub>PER)

	Model 3 (WPER)				Model 4 (APER)				
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	
GOV	-0.194	-1.423	-0.152	-1.200	GOV	-0.198	-1.321	-0.166	-1.156
COM	-0.010	-0.066	-0.001	-0.005	COM	0.019	0.112	0.028	0.172
CUS	-0.080	-0.525	-0.238	-1.647	CUS	-0.011	-0.066	-0.194	-1.144
JOWN	-0.272	-1.926	-0.238	-1.861	JOWN	-0.231	-1.507	-0.210	-1.463
LDS	0.337	2.408*			LDS	0.310	2.009		
GOAL			0.521	3.772**	GOAL			0.470	2.928**
D-scale	0.143	1.080	0.053	0.428	D-scale	-0.091	-0.620	-0.130	-0.921
Constant	1.203	3.573**	0.913	5.110**	Constant	1.376	3.085**	1.061	4.465**
Adj R <sup>2</sup>		0.220		0.337	Adj R <sup>2</sup>		0.114		0.198
F value		3.250*		5.058**	F value		1.961		2.854*
DW		2.191*		2.289	DW		1.685		1.488

Note: \*\*p < 0.01, \*p < 0.05



## Conclusion

In this paper, we analyzed the determinants of environmental management transfer and environmental performance, using data obtained from the subsidiaries of Japanese firms in Thailand. First, it is revealed that environmental management system in a subsidiary is developed depending on the transfer of practices from the parent firm. The parent firm intends to control the subsidiary the same as in domestic operations. Organizational capability of the subsidiary can typically be built and learned by the transfer of practices from the parent firm. Without the organizational routine provided by the parent firm, it is generally not possible for a subsidiary to independently develop the organizational routine until they acquire certain level of experiences. Therefore, there is a certain time gap of adoption of environmental practices between the parent and the subsidiary.

Second, environmental goal (GOAL) has significant positive relation with environmental management system. However, GOAL is not significantly related to green procurement. Rather it indicates a negative relation. The reason is that green procurement is mandatory for firms since it is necessary by regulation and for transactions with the customer.

Third, top leadership (LDS) was significantly related to water and air performance, but environmental goal (GOAL) was not significantly related to water and air performance. On the contrary, GOAL is significantly related to CO<sub>2</sub> (CO<sub>2</sub>PER) and waste performance (WSTPER). LDS did not have a significant relation to these indicators.

Our analysis indicates new findings in the international transfer of environmental practices. The research, however, has limitations in that it is an analysis of one specific country, and the number of samples is limited. We need to test the findings using a larger sample to generalize the results. How-

ever, a logical model for the international transfer of environmental management is explained, and evidence for the transfer shows consistent results.

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